8. Flow Measurement of Power Plant Water Resources and Discharges Using Thermal Imaging

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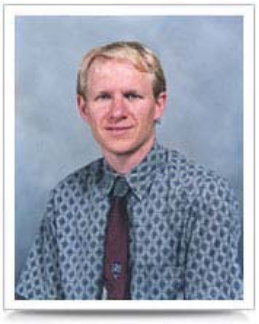

http://www.engineering.unl.edu/civil/faculty/admiraal.shtml

Over the past few years, thermal imaging cameras have become increasingly sensitive, more accurate, and less costly. There are many possible applications for these cameras associated with rivers and water bodies. The application proposed herein is to use the cameras to track the motion of thermal structures on the surfaces of rivers and canals. As the sensitivity and resolution of thermal cameras increases, the ability to track these thermal structures is also improving, with the result that tracking the motion of an entire water surface is now within our grasp. We are proposing a project in which we will explore the use of thermal imaging techniques to track thermal structures in the vicinity of power generation cooling water intakes and discharges. The cooling water discharges will provide plumes of warm water that can be tracked with a camera mounted on an aircraft. Algorithms for converting thermal images into velocity distributions will be developed and evaluated for thermal structures of various scales. Proposed laboratory and field measurements will define the capabilities and limitations of using thermal imaging for measuring water surface velocity distributions. In addition, where possible, the method will be extended to include flows that do not have warm water plumes (e.g., cooling water intakes and streams). The resulting techniques and tools will be extremely useful for a wide range of hydraulics applications that are beneficial to the energy sector and to any other entities for which surface water flow measurements are important.